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## A SUGGESTED ROLE OF ALTITUDE TRAINING UNITS IN PERSONAL EQUIPMENT WORK

The personal equipment program has been an undeniable success in combat theaters. It is somewhat surprising, therefore, that its adoption at Air Force Stations in this country has not been more widespread. Among the possible reasons for this is the belief that the program is essentially a combat expedient. Then too, it is frequently held that the agencies already established for the control of items of personal equipment are entirely adequate. Neither view can be substantiated. The care and maintenance of personal equipment, including oxygen equipment, is too often taken for granted or overlooked completely. While the end result of such an attitude may not be as dire in the continental United States as in combat theaters, it is poor training psychology. An aggressive program decreases the amount of attention the trainees should, but seldom do, give to their personal equipment and contributes to flying safety. Relatively small services are greatly appreciated by the crew members and definitely increase the efficiency of flying training. The need for training in the use of personal equipment is readily acknowledged.

The Altitude Training Units are singularly qualified for the task of organizing and administering the personal equipment program. Since heavy bombardment crews in the Second Air Force now receive an extensive altitude indoctrination at the processing center many Units have been able to curtail their low pressure chamber work and expand their interests to include all personal equipment, giving attention to supply, maintenace and inspection functions as well as to training activities. The following analysis of the activities of the Altitude Training Unit at the 222nd Combat Crew Training School (H), Ardmore, Oklahoma, in the personal equipment field is submitted at the suggestion of the Editor. The program is undoubtedly similar to that of other Units, although certain variance between and within Air Forces would be expected. The article is offered simply as an indication of an additional field of activity now open to many Altitude Training Units.

### ORGANIZATION

Administratively, the Altitude Training Section is a part of the Department of Ground Training. All training activities are channeled through and coordinated with the Director of Ground Training. In other functions, e.g., oxygen maintenance and the supervision of the parachute shops, this section is directly responsible to the Director of Training. Coordination with other department heads such as the Director of Aircraft Maintenance and the Surgeon is, of course, essential.

### PERSONNEL

The two Aviation Physiologists at this Station have been given the additional classification of 1042. The Director of the Altitude Training Unit is carried in this classification for primary duty as the Station Personal Equipment Officer and is

responsible for the overall supervision of the program. The other Aviation Physiologist is carried in his original MOS (3327) for duty as Altitude Training Unit Officer with additional duty as Assistant Personal Equipment Officer.

Two other officers (grounded flying officers) have attended the school for Personal Equipment Officers at Orlando and have been assigned to the duty of Assistant Personal Equipment Officer. In this capacity they work with and are directly responsible to the Station Personal Equipment Officer. Parenthetically, it is worth mentioning that experience has shown the permanently grounded flying officer to be a better choice for this duty than the engineering officer. The latter is more interested in engineering and usually continues in that work. On the other hand, grounded flying officers have given up all hope of returning to their old duty and approach their new task with great interest. Moreover, because of their previous training, they are more sympathetic with the problems of the combat crew members and can establish excellent rapport in training situations.

The organization is central, i.e., all officers are assigned to the Altitude Training Section rather than to the individual Combat Groups. This minimizes duplication of effort and permits a better coordination of activity. The duties are so divided that one is responsible for the parachute shops, one for maintenance activities and one for training activities.

The Altitude Chamber Technicians are carried for duty in the same MOS (617). Additional instruction has been given as needed to qualify them for their new activities. Their response to the new duties has been most commendable.

Technical supervision, through their respective Commanding Officers, is exercised over the activities of other EM such as parachute riggers and line personnel engaged in oxygen maintenance and life raft installations.

## PHYSICAL FACILITIES

The low pressure chamber building is the headquarters for all activities. In addition, a personal equipment building has been allotted for the storage, issue and care of electrically heated suits, life raft equipment including the dinghy radio, thermos bottles, food containers, certain parachutes, indeed all items of personal equipment used by the trainees. This is the headquarters from which the parachute shops are outfitted, airplanes equipped for overwater flight, etc. Motor transportation for the discharge of these duties has been permanently assigned to the section.

## SUPPLY, INSPECTION, AND MAINTENANCE ACTIVITIES

Maintenance, Inspection and Installation of Oxygen Equipment in the Airplane.

It has been found advisable to assign two to five Altitude Chamber Technicians to the line daily. These men work with and supervise the crew of men assigned by the Director of Flight Line Maintenance to the oxygen maintenance department. The 617's are highly trained and well qualified for the job. They participate

in all phases of oxygen maintenance, inspection of oxygen installations, replacement of unserviceable parts, care and maintenance of oxygen recharger carts and T.O. or TWX compliances. They construct special oxygen equipment such as portable G-1 bottles and make such additional installations (extra regulators) as are needed to facilitate the training program. The men closely watch the supply of oxygen and oxygen equipment to make certain that adequate quantities are always on hand. They keep a detailed record of the oxygen status of every airplane. The 617's generally supervise and instruct the line personnel in the servicing of the airplane and the handling of oxygen and oxygen equipment and see that the necessary safety regulations are observed. When T.O. compliances on the oxygen system will ground the airplanes all available men from this section are detailed to the line until the work has been accomplished.

Installation and Inspection of Life Rafts and Overwater Emergency Equipment.

Since each crew makes one overwater flight from this station life rafts have been installed in the airplanes. Men from this section assist in this work and make frequent checks to assure that the life rafts are inspected properly and at the required interval.

To prevent loss, and likewise to make it easier to stow the life raft, much of the equipment (water, rations, compass, flashlight, first aid kits, paulins) that is procured with the raft has been packed in ammunition boxes. These boxes, together with the dinghy radio and portable G-1 bottles are kept at the personal equipment building. This section is notified of all overwater missions and stows the above equipment in the airplanes for the flight only.

First Aid Kits.

This section controls the issue of all first aid kits. Aeronautic first aid kits are inspected, serviced and sealed at the personal equipment building and turned over to line personnel for issue to the crews prior to the flight. Boxes for the permanent storage of aeronautic first aid kits along with headsets, throat mikes and similar equipment have been constructed and are being installed in the airplane. The equipped box remains in the airplane and is locked at all times except during flight. The airplane commander signs for the equipment from the crew chief before the flight. To get a system of this sort instituted it has been necessary for this section to requisition a number of throat mikes and headsets.

Parachute first aid kits are issued by this section to the Group parachute shops where, in turn, they are issued to the crew members during processing. To insure adequate morphine control each kit is stencilled with a serial number and is issued by number to the trainee. A weekly inspection report is submitted by the co-pilot.

Parachute Shops.

Each Group has its own parachute shop and locker room over which this

section exercises technical supervision. The locker was designed and equipped by this department and accomodates all the flying clothes and parachutes of one crew. Other items of personal equipment, i.e., life vests, A-8B masks and thermos bottles, which are drawn for the flight only are issued in these shops. The parachute riggers assigned to the Groups are responsible for the inspection and care of all equipment under their jurisdiction.

In the supervision of the parachute shops, this section functions as follows: a. Makes certain that all inspections of parachutes and other items of personal equipment are up to date and that all T.O.'s and regulations involved are complied with and observed. b. Aids the parachute riggers in their inspections and lends such other assistance as may be necessary. c. Allocates the parachutes to the shops and makes certain that an adequate supply of serviceable packs are on hand at all times. d. Delivers the repacks to and from the Sub Depot Parachute Shop and establishes the priority for work in the department. e. Sets the standards that are to be followed. f. Sees that each shop has an adequate supply of serviceable A-8B masks, life vests, etc.

Each crew member is issued his parachute pack and harness during processing. The parachute harness is fitted and stitched and the oxygen mask fitted in the Medical and Personal Equipment Processing Building.

Flying Clothing.

Electrically heated suits are issued to the Enlisted Men of the crew at the personal equipment building where facilities for their testing and care have been established. Other flying clothes are not handled by this section.

Miscellaneous Functions.

Fire extinguishers are periodically inspected and weight tested.

Periodical checks make certain that the hooks for the parachutes have been placed in the airplane and have not been tampered with.

Men from this section tour the line and watch for misuse of parachutes by combat crew members. Altitude Chamber Technicians observe the crews during flight to make certain that they comply with all regulations concerned with the care of personal equipment.

## OXYGEN TRAINING

The oxygen training program has undergone certain revision. Everyone who passes through the Processing Center of the Second Air Force receives a low pressure chamber flight and associated instruction. Since a repeat performance at this station is neither appreciated nor instructive, only those few crew members who have by-passed the Processing Center are given a chamber flight. Experience has shown, however, that the trainees, confronted with their first high altitude flights, are still uncertain about the use of oxygen equipment. Consequently an intensive oxygen training program is needed.

The present system of oxygen training was initiated some months ago and has proven satisfactory. Under this plan, one officer of the crew, the Co-pilot, is appointed Crew Personal Equipment Officer and given a six hour course designed to qualify him for the assumption of his duties. Any academic discussion of topics that have been considered in earlier phases of training, is sedulously avoided, emphasis being placed on those topics that have proved most timely.

Thus armed with special knowledge and impressed with its importance, the Co-pilot assumes the responsibility of training his crew in the use of oxygen and personal equipment in that best of all classrooms, the airplane. The Co-pilots are encouraged to use the facilities at the Altitude Training Unit for instruction purposes while the crew is on standby status. The air conditioned building is a great incentive. In general, the response of the Co-pilots to this training and their readiness to assume the responsibilites of the job have been most gratifying. There are, of course, the inevitable few that are impervious to any appeal. For this reason, a system of altitude check outs has been instituted.

At least once during its training every crew is accompanied on a high altitude flight by an Altitude Chamber Technician. This instructor checks the crews knowledge of oxygen usage, observes their use and care of personal equipment, gives such instruction as is required, conducts such drills in emergency procedures as are practical and in general checks on the proficiency of the Co-pilots instruction and the ability of the crew to function properly at high altitude. Such deficiencies as are met are corrected on the spot. The EM are placed on flying status, per authority contained in Army Regulations 35-1480 and AAF Regulation 35-29. A request for the Officers was denied.

Late in their training the entire crew attends a one to two hour conference period on the problems of high altitude flight. This includes a general recapitulation of the practical points of Aviation Physiology, stressing such points as will be of greatest combat value, and answering all questions that may be troubling the crew members.

It is the opinion of the Aviation Physiologists and other interested parties that the overall program is far superior to the previous type of instruction that required low pressure chamber flights at the Combat Crew Training Schools. The crews are much more oxygen conscious than was formerly the case. To foster this, the Co-pilot is required to accomplish a report after every high altitude flight, noting any evidence of anoxia in his crew members, any defective equipment, and the amount of oxygen his crew used. It has been found, too, that the pilot is more careful not to neglect noting any defective oxygen equipment on the Form 1A. Consequently, oxygen maintenance is benefitted. Finally, definite benefits accrue to the personnel of the Altitude Training Unit. The men become more familiar with the problems of the Combat Crew. The quality of their instruction accordingly improves.

## DITCHING TRAINING

Ditching training occupies a large part of our training program. The training program consists of both lecture work (4 hours) and ditching drill. The lecture work includes a demonstration and discussion of the use of overwater emergency equipment, a discussion of the ditching drill to include the duties of the crew members, ditching stations, etc., a lecture by some instructor pilot who has ditched, in which he recounts his experiences and discusses the precautions he believes should be observed, and a showing of pertinent films.

Ditching drill is accomplished under the supervision of personnel from this section in an airplane provided for that purpose. The section has been fortunate in obtaining permission to use a lake in the immediate vicinity on which to conduct wet ditching drill and a familiarization program for life raft and overwater emergency equipment. Approval of higher headquarters must be obtained before this phase of the ditching training can be effected but this is expected momentarily.

## INCIDENTAL INSTRUCTION

Instruction on bail-out and care of the parachutes is given the crew during briefing at some time early in their training. Instruction to maintenance personnel engaged in personal equipment work is given continuously.

The administration of this program has been a most gratifying experience to both officers and enlisted men of the Altitude Training Unit. Full cooperation has been obtained from all departments at this station.

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## THE VALSALVA MANEUVER IN PREVENTING AERO-OTITIS MEDIA

With most individuals the Valsalva maneuver is an effective simple method of ventilating the middle ears during descent from real or simulated altitude. But its use is necessitated only when the acts of swallowing, yawning, or the aviator's jaw motion fail to adequately open the Eustachian tubes and allow an equalization of air pressure.

The objections to use of the Valsalva maneuver have been: 1) the possibility of damage to the tympanic membranes by over-inflation; and 2) the possibility of causing otitis media by forcing the infected discharge of a rhinitis through the Eustachian tube and into the middle ear.

In answer to the former objection, the following observations are important. The greatest pressure which the average individual can create by blowing against a manometer is 80 to 130 mm of mercury. According to Armstrong, the pressure necessary to rupture the normal tympanic membrane is 100 to 500 mm of mercury. The pressure necessary to ventilate the middle ear by the Valsalva maneuver rarely exceeds 60 mm of mercury.

In answer to the objection concerning the production of suppurative otitis media, it may be stated that the incidence of middle ear infection accompanying aero-otitis media is exceedingly low. This has been equally true in those who used the Valsalva and in those who did not attempt or succeed in such middle ear ventilation. Nevertheless, each man at this station is advised that he should evacuate his nasopharynx of secretion by forcibly drawing back air through the nose, before the Valsalva is attempted. It is felt that this minimizes the possibility of forcing infected mucoid material into or through the Eustachian tubes. Obviously, a man with a copious, thick, mucopurulent nasal discharge should not be allowed to fly or ascend in the altitude chamber.

It has been found that the Valsalva maneuver may be made more effective by holding the head erect rather than flexed on the chest. A maximum unilateral effect may be gained by bending the neck so that the head nearly rests on the opposite shoulder, rotating the chin away from the shoulder, and then increasing the intranasal pressure. Frequently, ventilation is not accomplished by the individual because he has been told to blow gently. This is an obvious error in instruction, for it requires about one pound (50 mm Hg.) pressure to perform a successful Valsalva in most individuals and such a force is not developed by blowing gently.

It is recommended that each individual who is to be exposed to the rapid barometric pressure change of either the altitude chamber or actual flight be instructed in the use of the Valsalva maneuver. This instruction should include a description of the optimum head position and pressure to be used in attempting inflation, an admonition to clear the nasopharynx of discharge before positive pressure is applied, and a warning concerning the ineffectiveness and possible danger of all methods of inflation when a copious, mucopurulent discharge is present in the nose.

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## THE USE OF RADIO CODE AS A TEST FOR MENTAL EFFICIENCY IN ANOXIC RADIO GUNNERS

At the 43rd Altitude Training Unit, most of the men receiving the high altitude training are graduates of Army Radio Schools. It was, therefore, felt that these men (being trained at this base as radio gunners) would be eager to participate in a test for anoxia which involves the use of radio code. Such a test, it was felt would be of practical research value in further studies on anoxia because it could be made quantitative.

During routine chamber flights, radio code was transmitted to the subjects in the chamber on three different occasions, the first being at ground level during the ear check, the second, 10 minutes after their arrival at 18,000 feet (without oxygen masks) and the third test, 20 minutes after the men put on oxygen masks (still at 18,000 feet). Code consisted of 75 mixed characters (letters and numbers) in groups of five, delivered at the rate of 75 characters per minute. Three different code tapes were used (variability was found to be negligible); however, all had in common the fact that the same characters were used the same number of times in all three codes. Furthermore, codes were rotated, so that the order in which code tapes were used varied on successive flights. Men who made too poor a score at ground level were eliminated from the test. This number varied from flight to flight so that each flight had a varied number of participants in this test. A total of 18 chamber flights were made involving 174 men.

Table I shows that the highest scores (average for each flight) occur when subjects are using oxygen or are at ground level without oxygen. At 18,000 feet, without oxygen, the average scores for each flight are lower in all cases. It is quite apparent that there is considerable variation in the scores taken at 18,000 feet, indicating a variable response of the subjects at this altitude. This is probably due both to difference in the oxygen content of the chamber from one flight to the next and to differences in the ability of each man to withstand lack of oxygen. The average score for all flights is 97.2% $\pm$ 0.61 at ground level, 96.0% $\pm$ 1.03 when using oxygen and 78.5% $\pm$ 7.6 when the subjects are without oxygen for 10 minutes at 18,000 feet.

Acknowledgment is made to Private Alvin B. Davidson for his part in carrying out this project.

TABLE I

| Order in which Code Used | No. Men in Flight | Average Score ground level | Average Score 10 Min. 18,000 ft. | Average Score Oxygen Used |
|---|---|---|---|---|
| A-B-C | 8 | 97.2% | 45.5% | 98.3% |
| A-B-C | 5 | 98.1 | 93.3 | 98.1 |
| A-B-C | 8 | 97.8 | 92.0 | 98.3 |
| A-B-C | 6 | 98.7 | 71.8 | 97.3 |
| A-B-C | 7 | 97.7 | 76.0 | 96.6 |
| A-B-C | 8 | 96.2 | 79.2 | 96.9 |
| B-C-A | 9 | 97.1 | 80.6 | 97.8 |
| B-C-A | 12 | 96.3 | 75.3 | 97.6 |
| B-C-A | 12 | 97.2 | 83.4 | 94.8 |
| B-C-A | 7 | 98.1 | 86.1 | 97.3 |
| B-C-A | 10 | 95.5 | 82.9 | 96.4 |
| B-C-A | 13 | 97.5 | 79.4 | 96.1 |
| C-A-B | 17 | 96.4 | 76.6 | 94.1 |
| C-A-B | 6 | 98.2 | 84.0 | 97.6 |
| C-A-B | 10 | 96.0 | 61.3 | 94.0 |
| C-A-B | 11 | 97.0 | 78.5 | 96.1 |
| C-A-B | 17 | 97.3 | 86.6 | 95.5 |
| C-A-B | 8 | 96.5 | 81.2 | 95.2 |
| Average for all flights | | 97.2 ± 0.61 | 78.5 ± 7.6 | 96.0 ± 1.03 |

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## MANUALLY CONTROLLED ALTIMETER FOR ALTITUDE CHAMBER

In the past several months this unit has been requested to conduct quite a few special altitude studies on flying officers up for reclassification or flying evaluation. These requests were initiated by the Second Air Force Reclassification Board, or the Flight Surgeon, 214th A.A.F. B.U. (C.C.T.S.). It was felt that an altimeter which could be manually controlled to read any desired altitude, independent of the actual chamber altitude, would be of value in differentiating between

psychogenic symptoms (as seen in malingering or fear of flying) and organic symptoms. Such an altimeter was designed by this Unit and installed about 1 May 1944.

This altimeter is so designed that the outside chamber observer, by means of two needle valves, may manually control the altimeter to show any desired altitude from ground level to 40,000 feet, and any rate of ascent or descent from 200 feet per minute to 6,000 feet per minute. A commercial oxygen cylinder evacuated by the chamber vacuum pumps provides the vacuum for ascent. Descent is controlled by opening a needle valve to outside atmospheric pressure. The altimeter and rate of climb meter (inside the chamber) are connected with the control box and and vacuum tank by aluminum oxygen tubing. When not in use for special test flights, the altimeter may be made to read true chamber altitude by opening a valve inside the chamber subjecting the alimeter to the true atmospheric pressure within the chamber.

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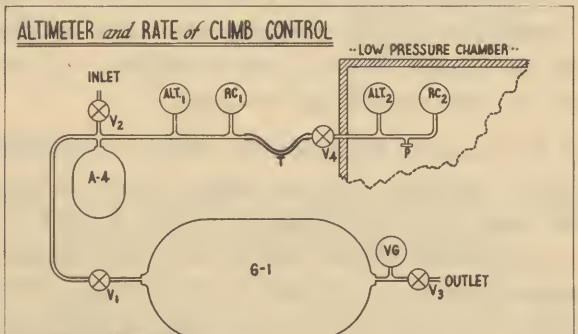
EDITOR'S NOTE: Similar devices to the one described are in use at the Altitude Training Units at Lincoln AAF, Lincoln, Nebraska, and at Gowen Field, Boise, Idaho. The personnel of the Altitude Training Unit at Buckingham AAF, Ft. Myers, Florida have devised, and are using, an altimeter which can be controlled manually from the outside of the chamber by means of a crank. Below is a diagram of the system in use at Lincoln Army Air Field.




5-1893, AF

PREPARATION OF FLYING HELMETS FOR DEMAND OXYGEN MASK ATTACHMENT

In our experience the present method and procedure of preparing winter and summer flying helmets for oxygen mask attachments are unsatisfactory for several reasons:

The entire procedure, from initial drawing of the helmet and mask to their final integration on the aviator, is too time consuming. Normally, the flyer draws both the helmet and mask from local sub-depot supply, procedes either to his squadron oxygen officer or the nearest Altitude Training Unit where the correct position for the mask studs is marked, and then returns to the sub-depot (fabric dept.) where the studs are sewn on, and ear cups added.

Much opportunity for error in placement of the studs exists under the present method. Proper studding position depends on several factors; namely, size and fit of the helmet, facial configuration and the type of demand mask to be worn. In some instances, where Altitude Training Units are not present, inexperienced personnel, without regard for the factors mentioned previously, stud the helmet so that a proper mask fit cannot be obtained.

A flying helmet previously studded for one type of demand mask, e.g. A-10R cannot be used safely with the newer types of demand mask, such as the A-14, without restudding. The result is either a subsequent trip to the fabric department or a clumsy attempt to affix the new mask on the old studding positions.

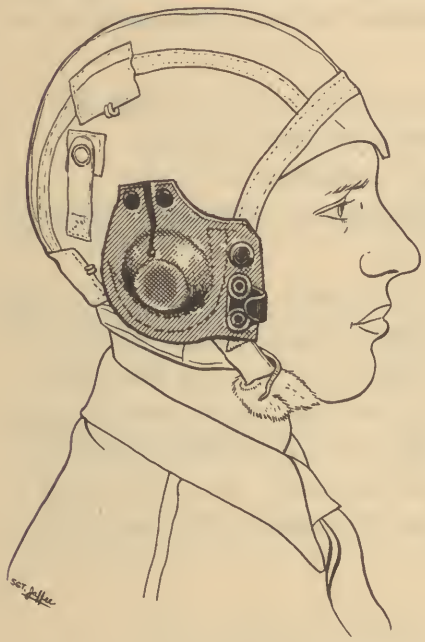
The present design of ear cups on flying helmets is such that there is not sufficient room to place the studs properly.

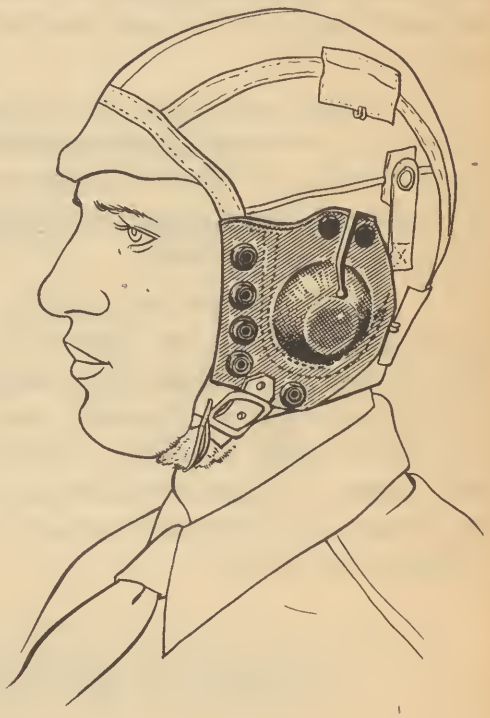
The usual practice of studding directly through the helmet (winter) material is not desirable since contact of the metal with the skin may cause heat loss due to the extremely low temperatures at high altitudes.

It is felt that these unsatisfactory conditions can be alleviated to a very considerable extent by incorporating the ear cups and studs for oxygen mask attachment into a single integrated unit as illustrated in the accompanying sketches. If sufficient, properly placed studs are provided any type of demand mask now in use can properly be fitted on the helmet without modification. It is preferable that this unit be made of leather, but fabric can be used.

The use of such a standard item should effect a considerable saving of time and work on those fields servicing large numbers of flying personnel, since the application of the ear cups and the studding would be done in one operation. The liability of error in placement of the studs would be reduced to a minimum. Moreover, a helmet so prepared could be fitted with any type of oxygen mask (demand) now in use and without basic modifications, thus facilitating a change from an older type of demand mask (e.g. A-10R, or A-10 converted) to one of the newer types. This method of attaching ear cups and mask studs to helmets has proved itself through continuous use at MacDill Field for a number of months.

The preceding comments and recommendations have been incorporated in an Unsatisfactory Report. The Altitude Training Unit at MacDill Field has been informed that the Air Service Command is taking action along the lines suggested.





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## AN ATTEMPT TO EVALUATE THE EFFECTIVENESS OF CERTAIN ALTITUDE CHAMBER DEMONSTRATIONS

At Smoky Hill Army Air Field an effort has been made to gather data relating to two questions: a. How do various demonstrations compare in teaching value? b. Do flying personnel profit by experiencing certain symptoms during chamber runs?

Personnel of the Altitude Training Unit administered questionnaires to all passengers upon completion of the chamber flight. In addition to questions concerning symptoms, one question was worded, "From what chamber demonstration(s) did you learn the most?" This was followed by the various choices listed in Table I. Although judgments of crew members cannot give an ultimate answer as to the value of demonstrations it is believed that men in OTU training will be among the best judges of the applicability of such demonstrations to their duties in the air.

The items "Ears and Sinuses", "Bends" and "Gas Pains" refer to what was learned by observing these symptoms and listening to the discussion during chamber flight. "Practice Oxygen Procedures" included: simulated bail-out, simulated unconsciousness and treatment by one of the passengers, and use of mask regulator in emergencies.

Results were obtained for 680 flying personnel in OTU training. Practically all of these men had had some flying experience and the median for the group was 100 flying hours. Totals were obtained for the whole group; for the 228 men with no experience flying on oxygen; and for the 228 men with the most experience flying on oxygen (median 30 hours). Results for the whole group and for those who had not used oxygen in flight were practically identical, so only the last two tabulations are presented. Demonstrations are ranked in each case in accordance with their frequency of choice.

TABLE I

Demonstrations from which Subjects Reported Learning the Most

| | Subjects with no Flying time on Oxygen | | Subjects with High Flying Time on Oxygen | |
|---|---|---|---|---|
| | No. | Rank. | No. | Rank. |
| Anoxia 20,000 feet | 52 | 5 | 54 | 4 |
| Anoxia 25,000 feet | 68 | 4 | 71 | 3 |
| Anoxia 35,000 feet | 87 | 2 | 136 | 1 |
| Ears and Sinuses | 28 | 6.5 | 16 | 7 |
| Bends | 8 | 8 | 9 | 8 |
| Gas Pains | 28 | 6.5 | 20 | 6 |
| Practice Oxygen Procedures | 77 | 3 | 82 | 2 |
| Use of Walk-around | 126 | 1 | 39 | 5 |

It is believed that these figures offer some clue as to what chamber demonstrations should be emphasized in order to obtain effective indoctrination. The figures also suggest that certain demonstrations will prove more valuable when given in conjunction with definite phases of a man's flying training. It is proposed to obtain more data of this sort allowing the trainees to report on a greater number of demonstrations.

The question as to whether or not a trainee learns by experiencing symptoms has often been discussed. Experiencing anoxia is quite generally agreed to provide valuable training. However, the value of other symptoms has been little studied. A partial answer to this question was obtained by comparing the incidence of symptoms with subjects' reports on whether or not the same symptoms constituted one of the more valuable demonstrations. Questions left unanswered were disregarded in the tabulation.

TABLE 2

Teaching Value of Symptoms Experienced at Altitude

| Opinion on Chamber Demonstrations | Did Not Experience Symptoms | | Experiences Symptoms | | % Diff. | $X^2$ | P |
|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | | | |
| Ears and Sinuses | | | | | | | |
| Chosen as one of best | 100 | 17 | 25 | 29 | 12 | 6.8 | < .01 |
| Not chosen | 490 | | 60 | | | | |
| Gas Pains | | | | | | | |
| Chosen as one of best | 94 | 17 | 39 | 38 | 21 | 22.3 | < .01 |
| Not chosen | 467 | | 65 | | | | |
| Bends | | | | | | | |
| Chosen as one of best | 90 | 14 | 8 | 42 | 28 | 9.7 | < .01 |
| Not chosen | 561 | | 11 | | | | |

The results suggest that trainees are much more likely to profit from symptom demonstrations and discussions if they experience the symptoms themselves. The chi square criterion indicates that the differences are significant.

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Bachrach, William H., Capt., MC, Drew Field, Florida
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Baker, Edgar G. S., 1st Lt., AC, Altitude Training, Tyndall Field, Florida
Baker, Richard B., Capt., MC, Patterson Field, Ohio
Banner, Albert H., 1st Lt., AC, Salina, Kansas
Barker, Shirley H., 2nd Lt., AC, Altitude Training, March Field, California
Barnes, Broda O., Capt., MC, Kingman AAF, Arizona
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Barrick, Lewis E., 1st Lt., MC, deceased
Barry, Alexander, 1st Lt., AC, Altitude Training, Santa Ana AAB, California
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